

CLAIMS

What is claimed is:

1. An assembly for reinforcing an existing tower, the assembly comprising:
a plurality of reinforcing legs, with each reinforcing leg mounted adjacent a leg of the existing tower such that the reinforcing leg shares loads with the leg;
a plurality of braces, with each brace connected to and extending between pairs of reinforcing legs mounted on adjacent legs of the existing tower; and
wherein the plurality of reinforcing legs and braces form a reinforcing structural network that extends around at least a portion of the existing tower.
2. The assembly of claim 1, wherein the existing tower comprises a series of sections stacked one over the other, with each section including a series of legs and wherein there is provided joints between respective legs of adjacent sections of the existing tower, and wherein one or more of the plurality of reinforcing legs is configured to be mounted adjacent a leg in a section of the existing tower and interposed between a pair of section joints such that the reinforcing leg shares loads transferred through the section joints.
3. The assembly of claim 2, wherein the braces are configured to connect to and extend between pairs of reinforcing legs in each section of the existing tower, such that the reinforcing legs and braces form a reinforcing structural network that extends around at least a portion of the existing tower.
4. The assembly of claim 1, wherein the reinforcing legs include shim joints for accommodating tower dimensional variances by adjusting nominal lengths of the reinforcing legs.

5. The assembly of claim 1, wherein the braces comprise cross brace sections having one or more adjustable-length bracing members for accommodating tower dimensional variances by adjusting cross bracing spans.
6. The assembly of claim 5, wherein the adjustable-length bracing members comprise cross brace section members joined by sleeve nuts.
7. The assembly of claim 1, wherein the plurality of reinforcing legs comprises a set of reinforcing legs for each section of the existing tower to be reinforced.
8. The assembly of claim 7, wherein the plurality of braces comprises a set of braces for each pair of reinforcing legs in a set of reinforcing legs, and wherein there is provided a set of reinforcing legs for each section of the existing tower to be reinforced.
9. The assembly of claim 1, wherein the reinforcing legs each comprise a rigid leg having bearing plates at opposing ends, and wherein the bearing plates are configured for interconnecting consecutive reinforcing legs together to form an extended length reinforcing leg along a desired portion of a leg of the existing tower.
10. The assembly of claim 9, wherein the bearing plates are further configured for mounting to leg flanges at section joints between adjacent sections of the existing tower.
11. The assembly of claim 10, wherein the rigid legs of one or more reinforcing legs include a shim joint to adjust a total length of the rigid leg to match a section length between a pair of section joints in the existing tower.

12. The assembly of claim 10, wherein each bearing plate comprises a substantially flat plate attached normal to a long axis of the reinforcing leg to which it is mounted, and wherein the bearing plate includes one or more mounting holes to align with existing bolt holes in a leg flange at a section joint of the existing tower.
13. The assembly of claim 12, further comprising one or more shim plates to shim the shim joints of the one or more reinforcing legs.
14. The assembly of claim 9, wherein the rigid legs of one or more reinforcing legs include one or more bridge sections to bypass obstacles on the legs of the existing tower.
15. The assembly of claim 14, wherein the bridge sections comprise elongated plates that interconnect spaced apart sections of the rigid leg, while leaving open one or more section gaps to accommodate corresponding obstacles.
16. The assembly of claim 1, wherein the reinforcing legs each comprise one or more rigid reinforcing leg sections, and wherein consecutive reinforcing leg sections of a given reinforcing leg are rigidly interconnected to achieve a desired length.
17. The assembly of claim 1, wherein one or more of the reinforcing legs comprises two or more rigid reinforcing leg sections interconnected via bridging members
18. The assembly of claim 1, wherein the reinforcing legs each comprise a corner member that wraps around adjacent tower faces to thereby provide mounting faces running lengthwise on either side of a leg of the existing tower.

19. The assembly of claim 16, wherein the braces mount across a tower face by attaching to corresponding mounting faces of pairs of reinforcing legs.
20. The assembly of claim 17, wherein the braces include mounting points that align with one or more of the mounting holes in the corresponding mounting faces of the pairs of reinforcing legs.
21. The assembly of claim 1, further comprising a guy pull-off accessory configured to mount to a reinforcing leg rather than to a leg of the existing tower.
22. The assembly of claim 1, further comprising a boom gate mount configured to mount to a reinforcing leg rather than to a leg of the existing tower.
23. The assembly of claim 1, wherein the reinforcing legs comprise lengths of angled plate material, and wherein each reinforcing leg is configured to at least partially fit around a tower leg to which it is mounted.

24. A method of reinforcing an existing tower comprising:
mounting reinforcing legs along at least a portion of each tower leg in the existing tower to share tower loads with the tower legs; and
bracing the reinforcing legs by interconnecting pairs of reinforcing legs on adjacent tower legs of the existing tower with one or more cross braces.
25. The method of claim 24, wherein mounting reinforcing legs along at least a portion of each tower leg in the existing tower comprises mounting reinforcing legs between pairs of section joints of tower legs in one or more sections of the existing tower.
26. The method of claim 25, wherein bracing the reinforcing legs by interconnecting pairs of reinforcing legs on adjacent tower legs of the existing tower with one or more cross braces comprises interconnecting pairs of reinforcing legs within each reinforced section of the existing tower with one or more cross braces.
27. The method of claim 24, wherein the existing tower comprises one or more sections, and wherein mounting reinforcing legs along at least a portion of each tower leg in the existing tower comprises mounting consecutive reinforcing legs to consecutive tower leg sections of the existing tower by mounting respective ends of the consecutive reinforcing legs to either side of a section joint in the existing tower that joins the consecutive tower leg sections, such that tower loads transferred through the section joint are shared by the consecutive reinforcing legs.
28. The method of claim 27, wherein mounting respective ends of the consecutive reinforcing legs to either side of the section joint comprises:
at least partially unbolting the section joint;
aligning mounting holes in bearing plates fixed to the respective ends of the consecutive reinforcing legs with the section joint; and

re-bolting the section joint with the bearing plates.

29. The method of claim 24, wherein the existing tower comprises one or more sections and wherein section joints between consecutive tower leg sections of the existing tower comprise abutting leg flange plates of the respective tower leg sections, and wherein mounting reinforcing legs along at least a portion of each tower leg in the existing tower comprises mounting reinforcing legs between pairs of section joints of tower legs in one or more sections of the existing tower comprises mounting respective ends of a reinforcing leg to the leg flange plates at either end of a tower leg section.

30. The method of claim 24, wherein mounting reinforcing legs along at least a portion of each tower leg in the existing tower comprises mounting reinforcing legs between pairs of section joints of tower legs in one or more sections of the existing tower by mounting a reinforcing leg adjacent to and in a load sharing configuration with each tower leg section in a given section of the existing tower without relieving loading on that given section.

31. The method of claim 24, further comprising temporarily detaching a tower appurtenance from a point along a tower leg of the existing tower to be reinforced by a reinforcing leg, mounting a reinforcing leg to the tower leg at that point, and re-attaching the tower appurtenance to the mounted reinforcing leg.

32. The method of claim 24, further comprising removing an existing guy pull-off from a tower leg of the existing tower, mounting a reinforcing leg to the tower leg, and attaching a replacement guy pull-off to the mounted reinforcing leg.

33. The method of claim 24, further comprising reinforcing a base section of the existing tower such that loads from the reinforcing legs are transferred into the base section.

34. A tower reinforcing system to reinforce an existing tower, the system comprising:
a plurality of reinforcing legs configured to mount adjacent to existing tower legs;
wherein each said reinforcing leg is cross braced with at least one other reinforcing leg to form a reinforcing structural network surrounding at least a portion of the existing tower.
35. The tower reinforcing system of claim 34, wherein one or more of the reinforcing legs includes end bearing plates at reinforcing leg ends to permit interconnection of abutting bearing plates on consecutive reinforcing legs positioned along an existing tower leg to form an extended length reinforcing leg running along a desired length of the existing tower leg.
36. The tower reinforcing system of claim 34, wherein one or more of the reinforcing legs comprises two or more reinforcing leg sections positioned consecutively in end-to-end fashion and interconnected at abutting section ends via one or more bridging members.
37. The tower reinforcing system of claim 34, wherein existing tower comprises one or more tower sections, and wherein the plurality of reinforcing legs comprises a set of reinforcing legs for each section of the existing tower to be reinforced.
38. The tower reinforcing system of claim 35, further comprising a set of cross braces for each set of reinforcing legs, wherein the cross braces attach to pairs of reinforcing legs within each set of reinforcing legs.
39. The tower reinforcing system of claim 34, further comprising a plurality of cross braces to interconnect the reinforcing legs in each reinforced section of the tower, the cross braces being configured to mount to pairs of reinforcing legs on adjacent tower legs to form a network of cross braces that exteriorly surrounds at least a portion of the existing tower.

40. The tower reinforcing system of claim 34, further comprising a plurality of cross braces configured to mount exteriorly of the existing tower by attaching to the reinforcing legs.
41. The tower reinforcing system of claim 34, further comprising a bottom support configured to couple to the bottom-most reinforcing legs and thereby transfer loading from those bottom-most reinforcing legs into a tower base mount.
42. The tower reinforcing system of claim 34, further comprising one or more boom gate mounts, each configured to mount to one of the reinforcing legs and thereby provide a new attachment point for an existing boom gate that previously was mounted to one of the tower legs.
43. The tower reinforcing system of claim 34, further comprising one or more guy wire pull-offs, each configured to mount to one of the reinforcing legs and thereby provide a new attachment point for an existing guy wire that previously was attached to one of the tower legs.
44. The tower reinforcing system of claim 34, wherein the tower comprises one or more sections, and wherein the bearing plates of the reinforcing legs are configured to mount to tower leg flanges at section joints of the existing tower.

45. A tower reinforcing system to reinforce an existing tower having one or more sections, the system comprising:
- reinforcing legs configured to mount adjacent to tower legs of the existing tower by attaching at section joints of the tower legs;
 - each reinforcing leg configured to mount to a corresponding tower leg section and to share compressive loads transferred through the section joints of that tower leg section.
46. The tower reinforcing system of claim 45, wherein each reinforcing leg is configured to mount to tower leg flanges at section ends of a tower leg section without relieving loading on that tower leg section.
47. The tower reinforcing system of claim 45, wherein the reinforcing legs each comprise opposing end bearing plates interconnected by an elongated connecting member, and wherein the end bearing plates are configured to mount to tower leg flange plates at the section joints of the tower legs.
48. The tower reinforcing system of claim 47, wherein the end bearing plates each comprise a rigid plate that includes a cutout extending to a plate edge, the cutout being configured to receive a tower leg to thereby permit the end bearing plate to be positioned substantially in alignment with a corresponding one of the tower leg flange plates.
49. The tower reinforcing system of claim 48, wherein each end bearing plate further comprises one or more mounting holes that align with one or more existing fastener holes in the tower leg flange plate when the end bearing plate is positioned substantially in alignment with the tower leg flange plate.

50. The tower reinforcing system of claim 45, wherein each reinforcing leg comprises a corner member that at least partially wraps around the tower leg section to which it is mounted, and which provides mounting faces extending on either side of the tower leg to which it is mounted.
51. The tower reinforcing system of claim 50, wherein the mounting faces include one or more mounting holes for attaching one or more structural items to the reinforcing leg.
52. The tower reinforcing system of claim 51, wherein the one or more mounting holes comprise one or more rows of mounting holes running along at least a portion of each mounting face.
53. The tower reinforcing system of claim 50, further comprising one or more boom gate mounts, each configured to mount on at least one of the mounting faces of a reinforcing leg.
54. The tower reinforcing system of claim 50, further comprising one or more guy pull-offs, each configured to mount on at least one of the mounting faces of a reinforcing leg.
55. The tower reinforcing system of claim 50, further comprising one or more mount supports, each configured to fit around a backside of a tower leg opposite a reinforcing leg and comprising one or more mounting holes to align with one or more mounting holes in each of the mounting faces.